Table 1. Cycle Thresholds (Ct) of COVID-19 RT-PCR Test on Early Return to Work Testing (n = 57)

Negative PCR, No. (%)	Positive PCR (Ct<21), No. (%)	Positive PCR (Ct = 21–29), No. (%)	Positive PCR (Ct = 30–31), No. (%)	Positive PCR (Ct>31), No. (%)
2 (3.5)	7 (12.7)	38 (69.1)	4 (7.0)	6 (10.5)

Note. RT-PCR, reverse-transcription polymerase chain reaction.

Sunnyvale, CA) using the Xpert Xpress SARS-CoV-2/Flu/RSV assay (E gene and N2 gene SARS-CoV-2 targets).

Overall, 57 employees deemed essential to the clinical operations of the organization and ineligible to work from home completed the testing program. Among them, 56 employees completed their primary COVID-19 vaccine series with mRNA vaccines and 1 had the J&J/Janssen vaccine. All but 4 of these employees had received an mRNA booster >2 weeks prior to testing positive for SARS-CoV-2.

Testing for early return to work ranged from 5 to 8 days from initial symptoms or positive SARS-CoV-2 test. Of the 57 HCWs, 2 tested negative and 55 tested positive. One of the HCWs who tested negative was symptomatic at the time of original positive test and the other was not. Of the positive SARS-CoV-2 tests, the average Ct was 26. We did not detect a difference in the average Ct values of the 48 HCWs who reported symptoms at time of positive test versus the 7 HCWs who were asymptomatic. Among these 55 HCWs, 6 had a Ct ≥ 32 (Table 1).

Using the Ct cutoff of ≥32 as a conservative threshold, our program allowed 14.0% of tested HCWs to return to work early and 86% were required to complete the full isolation period of 10 days. Notably, if a Ct criterion of ≥30 had been utilized, only 21.0% of tested HCWs would have qualified to return to work early.

Numerous nosocomial outbreaks of COVID-19 have been reported since the start of the pandemic.[7,8] A systematic literature review of 35 hospital outbreaks revealed that 40% of the primary cases were HCWs.[7] Based on this, identifying HCWs who remain potentially infectious could decrease the risk of nosocomial COVID-19 cases in coworkers, patients, visitors, and others in the healthcare environment. Our data suggest that HCWs with asymptomatic or mild COVID-19 can potentially present a risk of infection to others if returning to work prior to day 10 of illness.

This study had several limitations. We used a modest sample size, and the study was conducted at a single center. During the study, 2 different testing platforms were used. Studies correlating Ct value with culture of viable virus were also published prior to the emergence of newer SARS-CoV-2 variants. Despite these limitations, our data resulted in a modification of our institutional return-to-work policy to allow those with a Ct ≥ 30 to return to work early. We suggest that outside crisis standards of care, healthcare systems should consider a 10-day return-to-work policy or implement test-based strategies, such as the one described here, for early return to work for HCWs with COVID-19.

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Fit testing of masks worn by frontline healthcare workers

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During the coronavirus disease 2019 (COVID-19) global pandemic, healthcare organizations have faced increasing pressure to establish and maintain a reliable supply of respirators for frontline clinical staff. Due to supply disruption, additional types of respirators have been sought, which have caused concern from frontline healthcare workers regarding their effectiveness to protect from viral aerosol exposure. Do additional masks brought in to address the shortfall of supply meet the expected standards for a mask seal? Healthcare workers have increasingly requested mask fit testing of regular and additional N95 and P2 masks.

International, national, and local guidance provide the quantitative assessment process for mask fit testing using a portacount machine.[1–3] The fit-test short protocol is consistent with the international Occupational Safety and Health Administration (OSHA),[2,4] Standards Australia,[5] and the Canadian Standards Association,[6] and it is supported by the US Centers for Disease Control and Prevention (CDC).[1] The protocol comprises 4 exercises while a mask is being worn: bending, talking, head up and down, and head side to side. The mask fit is tested, and an overall fit factor score is generated as a culmination of the exercise scores. For each exercise, a numerical value is generated reflecting the seal of the mask. To pass an exercise, the value must be ≥100. Irrespective of whether an exercise is passed or failed, the score contributes to a final overall mask fit result; a positive score is between 100 and ≥200.[4] According to the current OSHA guidance for quantitative fit testing, the overall fit factor is important, not the individual exercise scores.[4] This guidance differs from the UK Health Safety Executive mask fit-testing guidance.[3] In this study, we utilized the OHSA quantitative fit-test short protocol[4] to determine whether the usual masks and additional masks obtained due to lack of mask supply had similar fit-testing results.

Methods

A cross-sectional survey was conducted using the OSHA short protocol across 3 hospitals in Sydney, Australia. A specialist external company was hired to undertake quantitative fit testing, and frontline workers were advised of the availability of mask fit testing at their hospital. A retrospective analysis of deidentified data from the cross-sectional survey was granted ethical approval by the Local Health District Human Research Ethics Committee (nos. X20-163 and 202/ETH00982).

Results

In total, 719 fit tests were conducted; 686 tests were performed on disposable N95 and P2 masks, and 33 fit tests were performed on reusable respirators. Only 1 reusable mask failed. Of all 686 disposable N95 and P2 masks tested, 377 (55%) achieved a passing positive fit score; however, 22.3% of these masks failed at least 1 or more exercises of the OSHA protocol. Of the 294 usual brands supplied before the pandemic, 37.1% achieved an overall passing score for fit factor, whereas 68.4% of the 392 additional masks supplied achieved an overall passing score for fit factor. The differences in mask-sealing scores were for the exercises that were performed as part of the OSHA protocol. Of the 294 usually sourced masks tested, 52% failed bending exercises, 54.8% failed talking exercises, 60.5% failed head side-to-side exercises, and 68.4% failed the head up-and-down exercises. Among the 392 additionally sourced masks, 31.4% failed bending exercises, 30.45% failed talking exercises, 33.7% failed head side-to-side exercises, and 34.7% failed the head up-and-down exercises.

Discussion

COVID-19 healthcare worker infections have been reported in which personal protective equipment (PPE) breaches could not be identified.[7] With a reduction in supply of usual brands of N95 and P2 masks, there was growing concern among frontline healthcare workers about the mask-sealing capabilities of the additional mask brands. With the introduction of additional brands, the question arose of whether these masks provided the same level of aerosol protection when fit tested compared to the usual brands supplied to the health service. Our results indicate that the usual N95 and P2 masks did not fit as many frontline healthcare workers compared to the additional N95 and P2 masks supplied during the pandemic. This finding would not have been identified if the supply chain for N95 and P2 masks had not been disrupted due to the pandemic.

The additional masks had a higher rate of overall fit than the usual masks supplied. This rate of mask fit is consistent with other published studies on mask fit testing associated with healthcare workers.[8,9] Importantly, a percentage of masks with an overall positive fit test failed at least 1 OSHA exercise. Previously published N95 and P2 quantitative mask fit-testing studies have not reported the pass or failure rates of exercises in the OHSA QNFT protocols. In this study, failure of a QNFT exercise did not prevent an overall positive fit-test result. The OSHA protocol exercises are consistent with healthcare workers' regular actions or movements when caring for COVID-19 patients, and failure of an exercise potentially places frontline workers at risk of viral exposure at the point of care.[9,10] Is an overall passing score for a mask fit-test result sufficient during a pandemic in determining aerosol protection for frontline healthcare workers when not all test exercises are passed in a controlled quantitative mask fit-testing environment?

Our findings suggest that a wider variety of brands of N95 and P2 masks should be available to healthcare workers to ensure optimal protection from respiratory airborne viruses through better fitting N95 and P2 masks. Although we did not focus on the physical face shape or nose size and shape as part of the mask-fitting process, future studies could consider these important facial characteristics in determining brands and mask types that are more effective in providing a mask seal. In addition, future research is required to understand the differences in risk associated with international mask fit-testing protocols (ie, OSHA or UK HSE guidance). Risk assessment associated with airborne viruses should consider healthcare workers' head and body movements in the delivery of clinical care.

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